

9(p-4)=-18 What Does P Equals ?

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Mathematics often presents us with equations that seem complex at first glance but become straightforward once we understand the fundamental principles involved. One such equation is $9(p-4) = -18$. At first glance, it looks intimidating, but with a step-by-step approach, we can uncover the value of p efficiently. This problem is a classic example of solving linear equations, a foundational skill in algebra. Whether you're a student brushing up on your algebra skills or someone seeking to understand how to manipulate equations, this guide will walk you through the process of solving for p in detail.

Understanding the Equation: $9(p-4) = -18$

Before diving into the solution, it's essential to analyze the structure of the equation. The equation $9(p-4) = -18$ involves a coefficient (9) multiplied by a binomial expression ($p - 4$). Our goal is to isolate p on one side of the equation, which involves reversing the operations step by step.

Step-by-Step Approach to Solving for P

The process of solving for p involves several elementary algebraic operations:

- Distributive property
- Addition or subtraction to isolate the term containing p
- Division to solve for p

Let's explore each step in detail.

Step 1: Applying the Distributive Property

The first step is to eliminate the parentheses by distributing the 9 across the terms inside. This means multiplying 9 by both p and -4 :

- $9 \times p = 9p$
- $9 \times -4 = -36$

So, the equation transforms from:

$$9(p - 4) = -18$$

to

$$9p - 36 = -18$$

Step 2: Isolating the Term with P

Next, we want to get all terms involving p on one side of the equation and constants on the other. To do this, add 36 to both sides to cancel out the -36 on the left:

$$(9p - 36) + 36 = -18 + 36$$

which simplifies to:

$$9p = 18$$

Step 3: Solving for P

Now, divide both sides of the equation by 9 to isolate p :

$$9p / 9 = 18 / 9$$

which simplifies to:

$$p = 2$$

Conclusion: What is the Value of P?

After following the steps systematically, we find that:

$$p = 2$$

This is the solution to the equation $9(p-4) = -18$. Whenever you encounter similar equations, remember the key steps: distribute, isolate the variable, and divide.

Additional Insights on Solving Linear Equations

Understanding how to solve equations like $9(p-4) = -18$ is crucial because it lays the foundation for more complex algebraic problems. Here are some tips and common pitfalls to keep in mind:

Tips for Solving Linear Equations

- **Always perform inverse operations:** To undo multiplication, divide; to undo addition, subtract.
- **Be systematic:** Handle parentheses first, then combine like terms, and finally isolate the variable.
- **Check your solution:** Substitute p back into the original equation to verify correctness.

Common Mistakes to Avoid

1. Forgetting to distribute the coefficient across all terms inside parentheses.
2. Incorrectly adding or subtracting constants when isolating the variable.
3. Dividing by the wrong number or skipping steps leading to errors in the solution.

Practice Problems to Reinforce Learning

To solidify your understanding, try solving these similar equations:

1. $3(x + 5) = 24$
2. $7(2y - 3) = 35$
3. $4(2a - 1) = 20$
4. $5(p - 2) = 15$
5. $6(3q + 4) = 78$

Work through each problem step-by-step, applying the same principles demonstrated above.

Summary: Key Takeaways

- The original equation $9(p-4) = -18$ can be solved by distributing, isolating, and dividing.
- Distributing the coefficient across the parentheses simplifies the equation.
- Adding or subtracting constants helps isolate the variable term.
- Dividing both sides by the coefficient of p yields the solution.

Mastering these steps enhances your algebraic skills and prepares you for solving more complex equations.

Final Thoughts

Solving linear equations like $9(p-4) = -18$ is an essential aspect of algebra that builds critical thinking and problem-solving skills. By understanding each step and practicing similar problems, you develop confidence in tackling various mathematical challenges. Remember, the key is to approach each problem systematically, verify your solutions, and keep practicing to improve your proficiency. With patience and practice, solving for p or any variable in linear equations becomes an intuitive process that forms the foundation for advanced mathematics and real-world problem-solving.

Frequently Asked Questions

How do I solve the equation $9(p - 4) = -18$ for p ?

First, divide both sides by 9 to get $p - 4 = -2$. Then, add 4 to both sides to find $p = 2$.

What is the value of p in the equation $9(p - 4) = -18$?

p equals 2 after solving the equation step-by-step.

Can you explain the steps to solve $9(p - 4) = -18$?

Yes. Divide both sides by 9 to get $p - 4 = -2$, then add 4 to both sides to find $p = 2$.

Is the solution to $9(p - 4) = -18$ unique?

Yes, the solution $p = 2$ is unique for this linear equation.

What is the importance of isolating p in the equation $9(p - 4) = -18$?

Isolating p helps find its exact value, solving the equation accurately.

Can I verify the solution $p = 2$ in the original equation?

Yes, substitute $p = 2$ back into the original equation: $9(2 - 4) = 9(-2) = -18$, which confirms the solution is correct.

Additional Resources

$9(p-4) = -18$ What Does P Equal?

Understanding how to solve for an unknown in algebraic expressions is a foundational skill in mathematics. The equation $9(p-4) = -18$ provides an excellent example to demonstrate the process of isolating the variable p and understanding the steps involved in solving for it. This article will explore the equation in detail, break down the solution process, discuss related concepts, and highlight common pitfalls and tips for mastering similar problems.

Understanding the Equation: $9(p-4) = -18$

Breaking Down the Equation

The given equation is:

$$9(p - 4) = -18$$

This is a linear algebraic equation involving a single variable p . The expression $9(p - 4)$ indicates that the quantity $(p - 4)$ is multiplied by 9. The goal is to find the value of p that makes this equation true.

The key steps involve:

- Recognizing the distributive property (if necessary)
- Isolating the term containing p
- Solving for p

Why Is This Equation Important?

Equations like this serve as building blocks in algebra. They help develop skills such as:

- Applying inverse operations
- Simplifying expressions
- Understanding the properties of equality and operations

Mastering these fundamentals enables students to approach more complex problems confidently.

Step-by-Step Solution Process

Step 1: Simplify Both Sides (if needed)

In this case, the left side is already simplified: $9(p - 4)$. No further distribution is necessary unless you prefer to expand first, but it's often easier to work with the factored form unless you need to expand for other reasons.

Step 2: Divide Both Sides by 9

To isolate $(p - 4)$, divide each side of the equation by 9:

$$\frac{9(p - 4)}{9} = \frac{-18}{9}$$

which simplifies to:

$$p - 4 = -2$$

Note: Dividing both sides by the same non-zero number preserves equality.

Step 3: Solve for p

Now, add 4 to both sides to isolate p:

$$p - 4 + 4 = -2 + 4$$
$$p = 2$$

Solution: $p = 2$

Verification of the Solution

Always verify your solution by substituting the found value back into the original equation:

$$\begin{aligned} & \backslash[\\ & 9(p - 4) = -18 \\ & \backslash] \\ & \backslash[\\ & 9(2 - 4) = -18 \\ & \backslash] \\ & \backslash[\\ & 9(-2) = -18 \\ & \backslash] \\ & \backslash[\\ & -18 = -18 \\ & \backslash] \end{aligned}$$

Since both sides are equal, $p = 2$ is the correct solution.

Alternative Approaches and Variations

While the standard approach involves dividing both sides by 9, students may encounter variations such as:

- Equations with different coefficients
- Equations requiring distribution before solving
- Equations with variables on both sides

Example:

Suppose the equation was $3(p - 4) + 2 = 8$.

Solution:

1. Subtract 2 from both sides:

$$\begin{aligned} & \backslash[\\ & 3(p - 4) = 6 \\ & \backslash] \end{aligned}$$

2. Divide both sides by 3:

$$\begin{aligned} & \backslash[\\ & p - 4 = 2 \\ & \backslash] \end{aligned}$$

3. Add 4:

$$\begin{aligned} & \backslash[\\ & p = 6 \\ & \backslash] \end{aligned}$$

Verification:

$$\backslash[$$
$$3(6 - 4) + 2 = 8$$

$$\backslash]$$
$$\backslash[$$

$$3(2) + 2 = 8$$

$$\backslash]$$
$$\backslash[$$

$$6 + 2 = 8$$

$$\backslash]$$

Confirmed correct.

Common Mistakes and How to Avoid Them

- Forgetting to divide both sides: Always divide or multiply both sides of the equation by the same number to maintain equality.
- Sign errors: Be cautious when adding or subtracting; double-check signs during each step.
- Distributing incorrectly: Ensure proper distribution when expanding expressions.

Tips:

- Write each step clearly.
- Check the solution by substitution.
- Practice similar problems to develop confidence.

Related Concepts and Extended Topics

Solving Equations with Variables on Both Sides

Sometimes, equations have variables on both sides, e.g.:

$$\backslash[$$

$$3p + 4 = 2p - 6$$

$$\backslash]$$

Solution involves:

- Moving all variable terms to one side
- Moving constants to the other

- Simplifying and solving for p

Understanding the Distributive Property

The distributive property states:

$$\begin{aligned} & \backslash[\\ & a(b + c) = ab + ac \\ & \backslash] \end{aligned}$$

It is vital when expanding expressions like $9(p - 4)$, especially if the expression inside the parentheses needs to be expanded before solving.

Graphical Interpretation

Linear equations can be visualized as straight lines on a graph. The solution $p = 2$ corresponds to the p-coordinate where the line intersects the axis, providing a visual understanding of the solution.

Features and Benefits of Mastering this Type of Equation

Features:

- Reinforces core algebraic skills
- Develops problem-solving strategies
- Enhances logical thinking

Pros:

- Simple, straightforward steps make the process manageable
- Provides foundation for more complex equations
- Improves understanding of inverse operations

Cons:

- Can become repetitive without variation
- Mistakes in signs or operations can lead to incorrect solutions
- Over-reliance on procedural steps without understanding may hamper deeper learning

Conclusion

The equation $9(p - 4) = -18$ offers a clear example of solving linear equations involving a single variable. By systematically applying inverse operations—dividing both sides to remove coefficients and adding or subtracting to isolate the variable—students can confidently find that $p = 2$. Understanding the step-by-step process, verifying solutions, and recognizing potential pitfalls are essential skills in algebra that serve as building blocks for more advanced mathematics. Mastery of such problems enhances problem-solving confidence and prepares learners for tackling a broad range of algebraic challenges. With practice and attention to detail, solving for p or any variable becomes a straightforward and rewarding process.

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